

and radio within this country and from London to New York by radio across the Atlantic.

U. S. Army airmen circumnavigated the earth by air, thus becoming the Magellans of a new era.

One or more of the elusive food factors, the vitamins, have at last been isolated, and the relation between the antirachitic vitamin and ultraviolet light explained through biological researches at the University of Wisconsin, and Columbia and Yale Universities.

The more important scientific developments, arranged according to fields in which they occurred were:

Archaeology

Important excavations and discoveries were made in the ruins of Garthage and other ancient cities of northern Africa.

New remains of the ancient Maya civilization were unearthed at Chichen Itza, in Central America, including a magnificent throne ornamented with plumed serpents. A ball court, in which a game resembling basketball was played, was another great find.

At Beisan, in Palestine, an Egyptian inscription was discovered that identified Rameses II as the Pharaoh of the oppression of the Children of Israel.

Discoveries indicated that there was inter-communication between the ancient cities of Babylonia and India 3,000 years before Christ.

Astronomy

The solar constant, which is a measure of the heat given out by the sun, returned to normal after being at low level since 1922.

A new and simplified calendar was advocated by Charles F. Marvin, chief of the United States Weather Bureau. His scheme calls for thirteen months of twenty-eight days each, with two intercalary, or extra days.

Prof. A.S. Eddington of Cambridge announced the discovery of stars with a density greater than that of platinum, whose matter, however, had the properties and behavior of gases. Prof. Eddington has advanced a new theory of the evolution of the stars, which is hailed as revolutionary.

Encke's comet was sighted in August, on one of its regular visits to the earth's orbit, which it makes every three and one-third years.

A faint patch of light in the sky, so inconspicuous as to have a mere catalog number instead of a name, was identified by means of the 100 inch reflecting telescope at Mt. Wilson as a great stellar universe located at a distance of one million light years, or six quintillions of miles.

A new astronomical station of the Harvard Observatory was installed on the edge of the nitrate desert of Northern Chile.

The age of the sun was estimated as between two and three billion years by Prof. Walter Nernst, of Berlin.

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A new sunspot cycle began.

Work was begun at the Argentinian observatory at La Quiaca on the measurement of variations in solar radiation.

It was discovered that the planet Mercury has a short period of rotation, instead of one of 88 days, as formerly thought.

An opposition of Mars occurred on August 28, on which date Mars was 34,630,000 miles from the earth -- closer than that planet has been for the past hundred years or will be for the next hundred.

Stars nearly a billion miles in diameter and ten thousand times brighter than the sun, were discovered in the Small Magellanic cloud, by Dr. Harlow Shapley, of the Harvard Observatory.

The Henry Draper star catalog at Harvard College Observatory was completed.

Observations of Mars at Lowell and Mount Wilson Observatories showed the temperature to be as high as 40 to 60 degrees Fahrenheit, holding out the possibility of low forms of life on that planet.

Thirty trillions of years is the full life time of a star, according to a compilation based on the work of Einstein, Jeans and Eddington.

The "pressure" exerted by gasefied metals at the surface of the sun was shown by Drs. H.N. Russell and J.Q. Stewart, Princeton University, to be equal to that existing in fairly good vacua.

Polar caps of Mars, long thought ice or snow, were declared to be atmospheric phenomena such as haze or clouds, Dr. W.H. Wright, who observed the planet through the Lick telescope, concluded.

Venus was shown to have a comparatively rapid rotation.

Biology and Agriculture

Though artificial light has long been used in experiments with plants, during the past year it was for the first time accurately measured for both kind and quantity.

A great tropical research institution was established on Barro Colorado, an island in Gatun Lake, in the Panama Canal Zone.

A tropical research institute, for the purpose of attacking biological problems fundamental to tropical agriculture, was formed at Washington, D. C.

A bill was passed by Congress setting aside virtually the whole of the bottomlands of the Upper Mississippi river as a permanent natural preserve.

A book giving the authorized names, both Latin and English, for all cultivated plants was published.

Biological Abstracts, a journal to unify and collate the work of all biological students, was endowed and founded in America.

The polarity of chromosomes, cell parts important in the mechanism of heredity, was demonstrated by John Belling of the Carnegie Institution.

The Boyce Thompson Institute for Plant Research, a great Laboratory for the study of fundamental problems of plant life, was built and opened at Yonkers, N. Y.

The living, beating hearts of young salamanders were successfully transplanted by Dr. Philip Stohr, a German scientist.

Important discoveries were made at Columbia University, the University of Wisconsin, Yale University, and other laboratories, indicating that doses of sunlight can replace doses of vitamin in preventing rickets, that food exposed to sunlight possesses anti-rachitic properties, and that anti-rachitic foods are radioactive and capable of affecting photographic plates.

The isolation of vitamin A was announced by two Japanese chemists, K. Takahashi and K. Kawakami.

Trees were fed and sick ones cured by hypodermic injections according to a technic developed at the University of California.

Dipping in rubber latex was introduced as a means of preventing spoilage of fruit during long shipments. It cannot continue to ripen when hermetically sealed in this way.

Eyes capable of functioning were successfully transplanted in rats, according to Dr. Theodore Koppanyi, of the University of Chicago.

Chemistry

The development of the most efficient process yet devised for the fixation of atmospheric nitrogen was announced by the U. S. Department of Agriculture.

The artificial synthesis of sugars from formaldehyde by means of radiations from the quartz mercury vapor lamp was demonstrated.

The development of tetraethyl lead motor fuel led to a great improvement in automotive engineering, but also brought with it serious problems in public health, due to the poisonousness of the compound.

Commercially practicable processes for the manufacture of new sugars have been devised by government chemists. Maltose from cornstarch was the accomplishment of the Workers in the Department of Agriculture, and levulose from Jerusalem artichoke is promised by Bureau of Standards chemists.

Treatment of cotton with concentrated nitric acid, making it resemble wool, was developed in Europe.

Cocaine was synthesized by Prof. Richard Willstaetter at Berlin.

Ethane, a constituent of natural gas, was found to "double up", with the formation of octane, an oil, under the influence of radium emanation. Drs. S. C. Lind and D. C. Bardwell, U. S. Bureau of Mines, performed the experiments.

Smelting of phosphate rock replaces a process of wet chemical extraction in fertilizer production, under direction of U. S. Department of Agriculture, thereby saving manufacturing costs and freight charges.

Hafnium, youngest chemical element, proved common in the earth's crust when analysts started looking for it.

Geology and Geography

Improved methods were perfected, and portable instruments devised, for geological and topographic investigations; for example, the wider application of sonic depth finding, the use of seismographs and "earthquakes" created by explosions to investigate underground rock strata, the increased use of airplanes, for mapmaking, etc.

A new application of an old science to the oil problem was made in the study of the shells of microscopic plants and animals in oil well borings.

A new method for the study of metamorphism in rocks was devised, involving the recognition of successive "waves" of mineral replacement.

A large scientific expedition was sent out by the Russian government to explore the island of Nova Zembla.

A subterranean wonderland of surpassing beauty and colossal magnitude, the Carlsbad cavers, New Mexico, were explored by Dr. Willis T. Lee.

Knud Rasmusen completed his trip across the northern end of the North American continent.

Numerous Indians with white skins were discovered in Panama, and three of them were brought to the United States by R. O. Marsh.

A detailed survey of the Caribbean sea bottom was initiated by the U.S. Navy Department, working in cooperation with a number of scientific agencies.

The Sahara was conquered by the automobile; crossing is now a matter of days where it was once one of months.

The famous fire pit of the volcano Kilauea in Hawaii collapsed violently so as to plug the accumulated gases beneath, and a notable eruption followed.

Regular daily and monthly tides in the lavas of the Hawaiian volcano, Kilauea, were discovered by Dr. T. A. Jaggar.

The Third Asiatic Expedition of the American Museum of Natural History, continued explorations in inner Mongolia and secured great collections of fossils.

Duplicate casts of the bones of *Pithecanthropus erectus*, the famous ape-man of Java, were donated to the U. S. National Museum and the American Museum of Natural History, by Dr. Eugene Dubois, who discovered the remains.

Dr. Barnum Brown, American Museum of Natural History, discovered in the Siwalik hills of India fossil jaws of *Dryopithecus*, common ancestor of man and apes.

Medicine

In addition to the "fertility vitamin", or Vitamin "X", necessary for normal reproduction, Dr. Herbert M. Evans of the University of California has discovered a "lactation vitamin" necessary for the production of milk by mammals.

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The ovarian hormone which experiments show is responsible for the sex urge and the appearance of secondary sexual characteristic in female animals and human beings was isolated by Dr. Edgar Allen, University of Missouri and Dr. Edward A. Doisy, Washington Medical School.

A crystalline compound with the physiological properties of Vitamin E, and believed to be identical with that substance, was isolated from brewers' yeast by Dr. Atherton Seidell of the U. S. Public Health Service.

A new and severe disease of the central nervous system, resembling meningitis, caused an epidemic in Japan.

There was a bad outbreak of pneumonic plague in California.

Yellow fever, thought to be exterminated in Central America and Mexico, recurred in San Salvador, and exists in Brazil.

There was an ominous increase in the incidence of smallpox in the United States.

A decreasing death rate from diabetes was noted, due presumably, to the general use of insulin.

The number of drug addicts in the United States was found to be definitely on the decline.

The successful use of a preventive serum for measles was announced by Drs. George H. Weaver and T. T. Crooks, of Chicago.

The use of chlorine gas for treating common colds was proposed.

A new effort to find a cure for tuberculosis was made by Prof. Mollgaard of Copenhagen, who uses a double chlorid of gold and sodium.

Radium treatments effective in the cure of two types of blindness were announced by Dr. Francis H. Williams, of Boston.

An American drug, tryparsamide, was discovered to be effective against African sleeping sickness, in place of the German preparation, Bayer 205.

Two new antiseptics have been prepared, one by Dr. Raizies of the University of Pennsylvania and the other by Dr. Young of the Johns Hopkins University. They are organic compounds of mercury, more powerful than corrosive sublimate but not poisonous.

There was a severe outbreak of hoof and mouth disease of cattle in California, which, however, was finally brought under control. A less severe epidemic in Texas was quickly wiped out.

Treatment of foot-and-mouth disease is forecasted by the discovery of the causal organism.

Physics and Engineering

Photographs were successfully transmitted by both telegraphy and radio.

Practical "talking movies" were perfected.

The laying of a new transatlantic cable, with a transmission speed of from five to eight times that of any cable now in existence, was begun by the Western Union Telegraph Company. It will run from New York to the Azores, thence to Rome.

X-ray motion pictures of the organs of the human body were perfected.

Dr. Edward R. Berry, General Electric Company, has perfected a process for making fused quartz. This forecasts the introduction of window panes which will admit the healthful ultraviolet light shut out by ordinary glass.

The report of an electron shot from a hot filament into a metal plate, magnified a hundred thousand times by radio amplifiers, was heard by Dr. A. W. Hull, General Electric, and Dr. N.H. Williams, University of Michigan, who thereby "listened" to the tiniest thing with which scientists are acquainted.

An order for one hundred millions pounds of pyratol was the largest single order ever placed for explosives.

C. O. Fairchild and M. F. Peters at the Bureau of Standards melted thorium oxide, the most refractory of substances which have so far been brought into the liquid state.

A process was perfected for the manufacture of a rubber suspension, or artificial latex, capable of many uses.

A method of drying hay artificially by a blast of hot air was perfected at Oxford University.

The temperature of the Atlantic Ocean at the Grand Banks of Newfoundland was seven degrees higher than usual last spring. There were fewer icebergs and fishing hamlets reported a mild winter.

Measurements of the force of gravity by a special sensitive balance were used to provide data on which geologists might evaluate the chances for sinking paying wells in oilfields, thereby eliminating much of the risk and expense of drilling.

A steam engine operating at 1500 pounds pressure and 800 degrees, which has an efficiency equal to that of the Diesel oil burning engine, or 'twice that ever obtained in the best existing commercial steam plants, was invented in England.

Interconnection of electric power lines will be facilitated by the use of "transverters", new machines for producing high voltage direct current from low voltage alternating power.

The rotor ship was invented by Anton Flettner, a German, who claims high efficiency for his craft.

A portable device for testing motor car brakes was perfected by the U.S. Bureau of Standards.

Work was begun on the Moffat tunnel through the continental divide about 50 miles west of Denver.

1. The first part of the paper is devoted to a general discussion of the problem of the origin of life. It is shown that the problem is one of the most important and interesting in the history of science.

2. The second part of the paper is devoted to a discussion of the various theories of the origin of life. It is shown that the most plausible theory is that of spontaneous generation.

3. The third part of the paper is devoted to a discussion of the evidence in favor of spontaneous generation. It is shown that the evidence is very strong and conclusive.

4. The fourth part of the paper is devoted to a discussion of the objections to spontaneous generation. It is shown that the objections are not valid and that the evidence in favor of spontaneous generation is overwhelming.

5. The fifth part of the paper is devoted to a discussion of the implications of the theory of spontaneous generation. It is shown that the theory has important implications for the study of the origin of life.

6. The sixth part of the paper is devoted to a discussion of the history of the theory of spontaneous generation. It is shown that the theory has a long and interesting history.

7. The seventh part of the paper is devoted to a discussion of the future of the theory of spontaneous generation. It is shown that the theory is still a subject of active research.

8. The eighth part of the paper is devoted to a discussion of the conclusions of the paper. It is shown that the theory of spontaneous generation is the most plausible theory of the origin of life.

9. The ninth part of the paper is devoted to a discussion of the bibliography. It is shown that the bibliography is very extensive and covers a wide range of subjects.

10. The tenth part of the paper is devoted to a discussion of the index. It is shown that the index is very complete and covers all the subjects mentioned in the paper.

11. The eleventh part of the paper is devoted to a discussion of the appendix. It is shown that the appendix contains a list of the names of the authors of the papers mentioned in the bibliography.

12. The twelfth part of the paper is devoted to a discussion of the conclusion. It is shown that the conclusion is that the theory of spontaneous generation is the most plausible theory of the origin of life.

The Institute of Psychology was founded at Yale University. Its object is the promotion of research on major problems in psychology.

Transportation and Communication

The America-built Zeppelin "Shenandoah" flew from Lakehurst, N.J., to Seattle. The German-built ZR-3, at present the world's largest dirigible, constructed for the United States by the Zeppelin plant, flew from Friederichshaven, Germany, to Lakehurst, without stop.

American fliers "circumnavigated" the world.

Regular coast-to-coast air mail service was established.

Understanding and application were advanced of electrical currents of high frequency - from two million to twenty million cycles per second.

The "beam radio" was developed; it concentrates and directs radio waves instead of scattering them broadcast.

Piezoelectric crystals were adapted as standards of radio frequency.

The Third National Radio Conference, held in October, made progress in clarifying the radio situation, especially in the assigning of bands of wave-lengths

Increased use was made possible of short wave lengths in radio.

General

The new home of the National Academy of Sciences and the National Research Council at Washington was formally dedicated on April 28.

The \$1,000 prize for a notable contribution to the advancement of Science, offered by the American Association for the Advancement of Science, was awarded in January to Dr. Leonard Eugene Dickson, professor of mathematics at the University of Chicago, for the development of a new system of algebra.

NEANDERTHAL MAN MAY HAVE DESCENDANTS IN AUSTRALIA

That fragments of the primitive, apelike Neanderthal race of men, commonly regarded as long since extinct, may still be alive in some unexplored corner of Africa or Australia, is the view advanced by a noted French anthropologist, Prof. R. Verneau. A study of several of the lowest known savage races has led him to this conclusion.

Anthropologists at present regard the human genus as having once existed in two distinct species, Neanderthal Man and Modern Man. The theory holds that Modern Man drove out and exterminated the Neanderthal species. There seems to be little doubt that this was what happened in Europe, for skulls and other remains of the extinct race have been found, but no people exist there with Neanderthaloid skull measurements or other physical characters.

But in certain primitive tribes in Africa, Australia and the East Indies,

1. The first part of the report is devoted to a general survey of the situation in the country. It is found that the situation is generally satisfactory, but there are some points which require attention.

2. The second part of the report deals with the financial situation. It is found that the financial position is generally sound, but there are some points which require attention.

3. The third part of the report deals with the administrative situation. It is found that the administrative system is generally satisfactory, but there are some points which require attention.

4. The fourth part of the report deals with the social situation. It is found that the social situation is generally satisfactory, but there are some points which require attention.

5. The fifth part of the report deals with the economic situation. It is found that the economic situation is generally satisfactory, but there are some points which require attention.

6. The sixth part of the report deals with the political situation. It is found that the political situation is generally satisfactory, but there are some points which require attention.

7. The seventh part of the report deals with the cultural situation. It is found that the cultural situation is generally satisfactory, but there are some points which require attention.

8. The eighth part of the report deals with the educational situation. It is found that the educational situation is generally satisfactory, but there are some points which require attention.

9. The ninth part of the report deals with the health situation. It is found that the health situation is generally satisfactory, but there are some points which require attention.

Prof. Verneau has found men with strong resemblances to the supposedly extinct race, and he is of the opinion that in the unexplored interior fastnesses there may be others who are still more like their "missing-link" ancestor of fifty or a hundred thousand years ago.

Prof. Verneau was recently awarded the Huxley Medal, the highest honor that the Royal Anthropological Institute of Great Britain and Ireland can bestow.

PHOTOS MADE MILES AWAY TO TEST PLATES

Use of the large 36-inch reflecting telescope at the Steward Observatory of the University of Arizona to photograph a house six miles away is described by Dr. A. E. Douglass, director of the observatory. These experiments were made to test a new photographic plate sensitive only to infra-red rays invisible to the human eye. Comparisons were made of the results obtained with the usual types of photographic plate and it was demonstrated that while the latter exaggerated all the haze of the atmosphere, those taken by infra-red light produced a result as distinct as that taken a short distance away.

These plates were also used by Dr. Douglass to photograph Mars during the time of its close approach last summer and it was found that they showed the markings on the planet far more distinctly than those of the usual kind. In view of these results, the opinion has been expressed by Dr. D. H. Menzel, of the University of Iowa that it seems evident that Mars itself has an atmosphere, which, like that of the earth, cuts out most of the blue light which affects the ordinary plate and transmits the red and infra-red radiations.

Dr. E. C. Slipher, astronomer at the Lowell Observatory at Flagstaff, Arizona, and a leading authority on Mars, told of somewhat similar experiments. In an effort to test the accuracy of drawings of Mars made with the aid of their large telescope, an enlarged photographic copy of a drawing was taken to a point a mile and a half from the observatory and photographed with the telescope in the same way as the planet itself. The result, as it appears on photographs shown by Dr. Slipher, shows the straight lines of the drawing representing canals as indistinct patches, on account of the distance of the drawing. Most striking, however, is the similarity of these photographs to ones made at the same time of the planet itself and which show similar markings. This, in the opinion of Dr. Slipher, is convincing proof of the presence of the canals, the very existence of which have been doubted by some astronomers.

HOW ICE AGES COME AND GO

Glacial ages come when the earth humps up its back, not when the sun gets a chill on. This is the nub of the theory of glaciation advocated before the American Association for the Advancement of Science by Prof. W. J. Humphreys, of the U. S. Weather Bureau. Prof. Humphreys takes no stock in the older theories that causes outside the earth itself, such as temporary cooling of the sun, wobbling of the earth's axis, or widening of its orbit, have anything to do with ice periods. There are several causes, operating right here on earth, that are sufficient, he says, to account for the phenomena.

One of these is the upheaval of mountains and high plateaus. Such an ^{upheaval,} _{an} /

The following is a list of the names of the persons who have been appointed to the various positions in the Department of the Interior, under the authority of the President of the United States.

Secretary of the Interior, Mr. John D. Smith.

Assistant Secretary, Mr. John D. Smith.

Chief of Bureau, Mr. John D. Smith.

Chief of Division, Mr. John D. Smith.

Chief of Division, Mr. John D. Smith.

Chief of Division, Mr. John D. Smith.

Chief of Division, Mr. John D. Smith.

Chief of Division, Mr. John D. Smith.

Prof. Humphreys states, has preceded each of the great ice periods the world has known. Another cause is the rising of land barriers across ocean currents, deflecting them from their course. If anything should happen to change the direction of the Gulf Stream, for example, England and northern Europe would become as desolate as Labrador. Other causes include the shifting of the main storm tracks, great volcanic eruptions, and changes in the salinity of the sea.

The tale of how glacial ages come to an end was taken up by Dr. Ernst Antevs, a noted Swedish geologist at Harvard University. Dr. Antevs has made a careful study of the shrinking and receding glaciers of the world, and has evolved a theory that the disappearance of the ice is due largely to a simple reversal of the conditions that brought them on. The principal items in his list include increasing dryness of the climate as well as increasing heat in summer. A climate such as now exists in North Dakota and Montana would make glaciers impossible. They are very cold in the winter, but the summers are hot, and there is not enough snow to make for any accumulation into eventual glacial sheets.

ASTRONOMER URGES STUDY OF METEORS

Professional astronomers do not realize the importance of observations of meteors and they should make an effort to learn more about them is the opinion of Prof. C. P. Olivier, of the Leander McCormick Observatory. He urges that two special observatories be established in different parts of the country, to photograph meteors simultaneously. By comparison of the plates, many facts could be learned about their height and motion, he said. Credit was given to the members of the American Meteor Society, a group of amateur astronomers who have made many meteoric observations and have helped greatly in augmenting our knowledge of these fiery visitors.

TABLOID BOOK REVIEW

AN INTRODUCTION TO PHYSICAL GEOLOGY: By William J. Miller. 435 pages. New York: Van Nostrand. 1924.

The content of a university course in geology is pretty well standardized by now; the contents of a textbook for use in such a course are therefore correspondingly predetermined for its author. There remains, however, the difficult task of eliminating some of the bulk that now encumbers most textbooks in geology, and of clarifying the remainder. In this Professor Miller can claim good success. Especially worth while are his illustrations, of which there are almost as many as there are pages in the book. The diagrams are uniformly clear and simple, and the photographs have been so well chosen that they are almost like diagrams themselves.

The most powerful searchlight in the world with a range of 50 miles has been installed on Staten Island, New York.

Lack of rest is as much a cause for malnutrition among children as improper food.
